

REMARKS/ARGUMENTS

The Examiner is thanked for the thorough examination and search of the subject.

Claims 1, 29, and 38 have been amended. Claims 2, 4-28, 30, 32-37, and 39-42 have been canceled.

The making FINAL of the Restriction requirement is noted. Non-elected Claims 2, 4-28, 30, 32-37, and 39-42, are hereby canceled. A divisional application will be filed to Claims 2, 4-28, 30, 32-37, and 39-42, once the elected Claims are allowed.

All Claims are believed to be in condition for Allowance, and that is so requested.

Reconsideration of Claims 1,3,38,43,45 and 47 rejected under 35 USC 103(a) as being unpatentable over Hashimoto (U.S. 4,768,085) in view of Wilder et al (U.S. 5,262,871) and Kozlowski et al (U.S. 6,532,040 B1) is requested based on Amended Claims 1 and 38, and on the following remarks.

Applicant has amended Claims 1, 29, and 38 to specify that the color amplifiers are "for generating a buffered color video signal from said readout pixel elements." This feature is not taught or suggested, individually or in combination, by the cited art of Hashimoto, Wilder, and Kozlowski. Amended Claim 1 now reads:

1. (Currently Amended) A color imaging system providing on-the-fly color interpolation using analog signals to reconstruct colors during sensor readout, the imaging system comprising:

an array of pixel sensor elements wherein at least part of the array is
5 arranged in rows and columns;

a color filter including a plurality of color filter components organized in a predefined pattern, the color filter overlaying at least a portion of the array;

a readout control circuit coupled to the array wherein the readout control circuit is configured to simultaneously read out values for a group of pixel
10 elements within a first portion of the array, including at least two pixel elements from two different rows and two pixel elements from two different columns and to reconstruct color components for at least a first pixel sensor element and a second pixel sensor element using color information from other pixels elements within at least the first portion of the array while the readout control circuit is
15 reading said first portion of the array and wherein said readout control circuit enables sub-sampling said array by skipping pixel elements along horizontal or vertical directions of said array; and

a plurality of color amplifiers for generating a buffered color video signal from said readout pixel elements each corresponding to one of said color filter
20 components wherein each said color amplifier has a programmable gain and wherein said color amplifiers are contained within said array of pixel sensors.

Claims 29 and 38 have been similarly amended. The feature added by amendment is

clearly shown in Fig. 4 of the original drawings wherein amplifiers 156, 166 and 172 are shown generating red, green, and blue video out signals 158, 162, and 168 respectively.

The Examiner cites Koslowski as showing a “programmable amplifier 50 is contained within the array of pixel sensors (i.e., noted that the programmable amplifier 50 is contained within the pixel circuitry 40 of the sensor array 10 of the CMOS; see Figs. 3 and 4; col. 7, lines 10+ and col. 9, lines 50+) as recited in the present claimed invention.” However, careful inspection of Koslowski reveals that programmable amplifier element 50 is not used to generated a “buffered video signal” as taught in Applicant’s claimed invention. Rather, Koslowski teaches a programmable amplifier 50 is part of an “offset cancellation circuit 60” that is used to nully offset noise. In particular, Koslowski states,

“FIG. 4 shows a preferred embodiment for the feedback loop for servicing the active pixel 10, including the feedback bus 101 and the relevant portion of the column buffer 40 necessary to either feed back the appropriately amplified pixel signal to null the offset noise read, or to read the conditioned APS output signal with suitable gain to achieve the required sensitivity. In addition, the preferred embodiment includes an offset-canceled output buffer to further buffer the video signal.

“According to the circuit of FIG. 4, an inverting amplifier 50 buffers the

pixel signal V.sub.n with variable, programmable gain and drives an offset cancellation circuit 60. Programmability of the gain of the amplifier 50 is provided by incorporating several feedback capacitor combinations 61 to optimize optical sensitivity over a range of camera "f-stops". " (column 9, lines 6-20)

The programmable amplifier 50 is actually used as part of an offset noise feedback loop. The actual video output is derived from the amplifier identified in Fig. 4 as element 90. The programmable amplifier 50 described by Kozlowski does not generate a buffered video signal output. However, the color amplifiers recited in the claimed invention do generate a buffered video signal output. Therefore, the programmable amplifier of Kozlowski is not equivalent to the color amplifiers of Applicant's claimed invention. Further, neither Hashimoto nor Wilder teaches or suggests the color amplifiers of Applicant's claimed invention including all of the features of that element.

It would not have been obvious for one skilled in the art at the time of the claimed invention to have practiced that invention based on the teachings of Hashimoto in view of Wilder et al and Kozlowski et al because these combined teachings do not teach all of the features of the elements of the claimed invention as recited in Amended Claims 1, 29, and 38. Therefore, Claims 1 and 38 should not be rejected under 35 USC 103(a) as being unpatentable over Hashimoto in view of Wilder et al and Kozlowski et al. In addition, Claims 3, 43, 45, and 47 recite patentably distinct, further limitations on Claims 1 and 38 that should likewise not be rejected under 35 USC 103(a) as being

unpatentable over Hashimoto in view of Wilder et al and Kozlowski et al.

Reconsideration of Claims 1,3,38,43,45 and 47 rejected under 35 USC 103(a) as being unpatentable over Hashimoto (U.S. 4,768,085) in view of Wilder et al (U.S. 5,262,871) and Kozlowski et al (U.S. 6,532,040 B1) is requested based on Amended Claims 1 and 38, and on the above remarks.

Reconsideration of claims 44 and 48 rejected under 35 U.S.C. 103(a) as being unpatentable over Hashimoto (U.S. 4,768,085) in view of Wilder et al (U.S. 5,262,871) and Kozlowski et al (U.S. 6,532,040 B1) as applied to Claims 1,3,38,43,45 and 47 in further view of Lee et al (U.S. 6,466,265 B1) is requested based on amended Claims 1 and 38 and on the following remarks.

As described above, the cited art of Hashimoto in view of Wilder et al and Kozlowski et al do not teach or suggest all of the features of the elements of the claimed invention recited in Amended Claims 1 and 38. In addition, the cited art of Lee does not teach or suggest the element of color amplifiers having the features of (1) generating a buffered color video signal from the readout pixel elements and (2) exhibiting a programmable gain and (3) being contained within the array of pixel sensors. It would not have been obvious for one skilled in the art at the time of the claimed invention to have practiced that invention based on the teachings of Hashimoto in view of Wilder et al and Kozlowski et al and Lee et al because these combined teachings do not teach all of the features of the elements of the claimed invention as recited in Amended Claims 1

and 38. Therefore, Claims 1 and 38 should not be rejected under 35 USC 103(a) as being unpatentable over Hashimoto in view of Wilder et al and Kozlowski et al and Lee et al. Finally, Claims 44 and 48 recite patentably distinct, further limitations on Claims 1 and 38 that should likewise not be rejected under 35 USC 103(a) as being unpatentable over Hashimoto in view of Wilder et al and Kozlowski et al and Lee et al.

Reconsideration of claims 44 and 48 rejected under 35 U.S.C. 103(a) as being unpatentable over Hashimoto (U.S. 4,768,085) in view of Wilder et al (U.S. 5,262,871) and Kozlowski et al (U.S. 6,532,040 B1) as applied to Claims 1,3,38,43,45 and 47 in further view of Lee et al (U.S. 6,466,265 B1) is requested based on amended Claims 1 and 38 and on the above remarks.

Reconsideration of Claims 29 and 31 rejected under 35 U.S.C. 103(a) as being unpatentable over Maenaka et al (U.S. 5,555,023) in view of Wilder et al (U.S. 5,262,871) and Kozlowski et al (U.S. 6,532,040 B1) is requested based on amended Claim 29 and on the following remarks.

As described above, the cited art of Hashimoto in view of Wilder et al and Kozlowski et al do not teach or suggest all of the features of the elements of the claimed invention recited in Amended Claim 29. In addition, the cited art of Maenaka does not teach or suggest the element of color amplifiers having the features of (1) generating a buffered color video signal from the readout pixel elements and (2) exhibiting a programmable gain and (3) being contained within the array of pixel sensors. Therefore,

it would not have been obvious for one skilled in the art at the time of the claimed invention to have practiced that invention based on the teachings of Maenaka et al in view of Wilder et al and Kozlowski et al because these combined teachings do not teach all of the features of the elements of the claimed invention as recited in Amended Claim 29. Therefore, Claim 29 should not be rejected under 35 USC 103(a) as being unpatentable over Maenaka et al in view of Wilder et al and Kozlowski et al. Finally, Claim 31 recites patentably distinct, further limitations on Claim 29 that should likewise not be rejected under 35 USC 103(a) as being unpatentable over Maenaka et al in view of Wilder et al and Kozlowski et al.

Reconsideration of Claims 29 and 31 rejected under 35 U.S.C. 103(a) as being unpatentable over Maenaka et al (U.S. 5,555,023) in view of Wilder et al (U.S. 5,262,871) and Kozlowski et al (U.S. 6,532,040 B1) is requested based on amended Claim 29 and on the above remarks.

Reconsideration of Claims 46 rejected under 35 U.S.C. 103(a) as being unpatentable over Maenaka et al (U.S. 5,555,023) in view of Wilder et al (U.S. 5,262,871) and Kozlowski et al (U.S. 6,532,040 B1) as applied to claims 29, and 31, and further in view of Lee et al (U.S. 6,466,265) is requested based on amended Claim 29 and on the following remarks.

As described above, the cited art of Maenaka et al in view of Wilder et al and Kozlowski et al do not teach or suggest all of the features of the elements of the claimed

invention recited in Amended Claim 29. In addition, the cited art of Lee does not teach or suggest the element of color amplifiers having the features of (1) generating a buffered color video signal from the readout pixel elements and (2) exhibiting a programmable gain and (3) being contained within the array of pixel sensors. Therefore, it would not have been obvious for one skilled in the art at the time of the claimed invention to have practiced that invention based on the teachings of Maenaka et al in view of Wilder et al and Kozlowski et al and Lee et al because these combined teachings do not teach all of the features of the elements of the claimed invention as recited in Amended Claim 29. Therefore, Claim 29 should not be rejected under 35 USC 103(a) as being unpatentable over Maenaka et al in view of Wilder et al and Kozlowski et al and Lee et al. Finally, Claim 46 recites patentably distinct, further limitations on Claim 29 that should likewise not be rejected under 35 USC 103(a) as being unpatentable over Maenaka et al in view of Wilder et al and Kozlowski et al and Lee et al.

Reconsideration of Claims 46 rejected under 35 U.S.C. 103(a) as being unpatentable over Maenaka et al (U.S. 5,555,023) in view of Wilder et al (U.S. 5,262,871) and Kozlowski et al (U.S. 6,532,040 B1) as applied to claims 29, and 31, and further in view of Lee et al (U.S. 6,466,265) is requested based on amended Claim 29 and on the above remarks.

Applicants have reviewed the prior art made of record and not relied upon and have discussed their impact on the present invention above.

Allowance of all Claims is requested.

It is requested that should the Examiner not find that the Claims are now Allowable that the Examiner call the undersigned at 989-894-4392 to overcome any problems preventing allowance.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'SBA', with a stylized flourish extending from the end.

Stephen B. Ackerman, Reg. No. 37,761